NAVAL AIR TECHNICAL TRAINING U
NAVAL SCHOOL, CAMERA REPAIR
U.S. NAVAL AIR STATION
PENSACOLA, FLORIDA.

IS Phase III (U7-L1-6) 29 November 1949

DIS-ASSEMBLY & RE*ASSEMBLY GRAFLEX FOCAL PLANE SHUTTER.

1. To dis-assemble the focal plane shutter;
Mark the curtain on the idler roller with a pencil mark when the curtain is set at the "0" position. Then remove rollers from the camera. Separate the curtain from the idler (top) roller.

2. To Re-assemble the focal plane shutter:
   (a) Replace lower tension roller first.
   (b) Check the convex tooth (buck tooth gear) and pinion to set numbers, correctly, (lower plate). Replace with #1 showing in window.
   (c) Replace the upper idler roller with curtain cemented on roller squarly.
   (d) Replace the upper escapement plate. Set figure "0" in window.
   (e) Replace the lower plate and wind tension on tension roller with small screwdriver. Wind sufficient tension on roller to cause curtain to travel across the focal plane when the upper curtain aperture plate reads "0". The curtain should travel across the focal plane in one-fifth of a second and lock, if tension applied is sufficient. Other speeds will then be correct, automatic.
   (f) Testing replaced curtain:
      (1) Turn camera in an up-side-down position.
      (2) Set shutter plates at "0" and #1
      (3) Release curtain through use of mirror.
      (4) Curtain should travel across the focal plane in 1/5 second and lock in place.
   (g) If focal plane speed test checks O.K. then locate pencil mark on replaced curtain and cement the "second" position on the idler roller. Now play should be left in curtain when released from "0" position If new curtain is being put into camera, then check new curtain against the old curtain for aperture openings. If they are the same, the second position for cementing the curtain on the idler roller will be determined by the camera repair man.

TROUBLES AND REMEDIES:

Shutter not operating correctly:

Cause:	Remedies:
1. Lack of lubrication	1. Lubricate bearings.
2. Foreign matter in shutter gearings.	2. Clean, overhaul shutter ass'y.
3. Tension plate damaged	3. Overhaul shutter
4. Mechanism plate damaged	4. Overhaul shutter
5. Shutter curtain stretched or broken.	5. Replace shutter curtain and overhaul mechanism
6. Shutter loops when released on high speeds.	6. Examine escapement plate; master gear may be worn or damaged, check for loose screws and tighten
7. Shutter curtain broken	7&8 Replace as necessary.
8. Tension spring broken.	

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IS Phase III (U7-L1-6) #1 29 November 1949

TROUBLE AND REMEDY INFORMATION SHEET.
4 x 5 Cut Film Magazine.

1. PULL ROD STICKS:
   Cause: Bent pull rod. Jerking and mis-handling.
   Remedy: Remove plate over pull rod and push rod to the rear of the magazine until it dis-engages the slot in which it rides, and lift off. Straighten the pull rod with the fingers and reassemble. Replace the old yarn found under the plate with new yarn.

2. LIGHT LEAK IN CUT-OFF:
   Cause: Normal wear. Weak cut-off springs.
   Remedy: Disassemble entire magazine, but do not remove the bag from the frames; removal of the wooden front frame is as far as it is necessary to go. The cut-off will be found underneath the wooden front frame. If the cut-off has come loose on the wooden frame it must be re-glued to the frame. However, before re-gluing, the cut-off must be reformed so as to lie snugly against the metal bag frame, when wooden frame has been assembled to the magazine. Fit new felts or yarn at the extreme corners on the underside of the wooden front frame next to the cut-off.

   Re-assemble wooden front frame to the magazine frame. Insert a dark slide into the cut-off and run it back and forth several times. Now, hold a light behind the cut-off and see if any light leaks through. When curtain no light leak is present, re-assemble the rest of the magazine.

3. BENT SEPTUMS:
   Cause: Drawing septums too quickly.
   Remedy: Straighten septums with the fingers. Replace all badly bent septums.

4. COVER FITS LOOSELY:
   Cause: Normal wear.
   Remedy: Refit cover catch.

5. DRAWS TWO SEPTUMS:
   Cause: Metal magazine liner frame worn at stop-bar.
   Remedy: Replacement of metal frame necessary. Magazine must be completely disassembled to replace this frame. Re-assemble magazine and test.

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IS Phase III, (U7-L1-6) #2

GENERAL NOTES ON THE 4 x 5 GRAFLEX, Model D.

Graflex Cameras are sturdily constructed, but like all fine equipment they should be handled with consideration. To preserve the neat appearance and increase the life of your camera, the leather may be cleaned with an occasional application of saddle soap or other good leather preservative. If kept in its carrying case when not in use it will be protected from dust, dirt and accidental blow.

The efficient life of any shutter will be greatly lengthened if all tension is released when the camera is not in use. In the case of the focal plane shutter, check both tension and shutter opening positions. NEVER OIL A FOCAL PLANE SHUTTER.

For best results the lens of your camera should be regularly cleaned. Use a soft, well washed linen handkerchief, a camel's-hair brush, or lens tissue. First blow off the dust, (a camel's-hair brush or small rubber ear syringe is recommended) and wipe without using pressure. To remove fingermarks or moisture, breathe upon the surface, and wipe. Always WIPE LIGHTLY, and with a CIRCULAR motion, Never use acids or any common household solvent for cleaning lenses. Lens cleaners supplied by lens manufactures may be used if the instructions accompanying them are carefully followed. If the inner surfaces require cleaning, the utmost care should be observed to remove the lens elements one by one: clean and replace each before the others are taken out. When replacing these elements screw them securely in place, but DO NOT USE EXCESSIVE PRESSURE.

GRAFLEX FIRST SURFACE MIRROR:

This mirror differs from ordinary mirrors in that the reflecting surface or 'coating' is on its FRONT SURFACE rather than on the back. This gives a brighter image on the ground glass and eliminates the "Double Images" and undesirable reflections sometimes found troublesome when focusing.

The coating used for this special mirror is a highly-reflective aluminum compound which retains its brilliance in the absence of a protective coating Care must be exercised in cleaning to guard against scratches from dirt or ther foreign matter. Loose dust may be removed by brushing with a tuft of clean cotton saturated with WATER. Any marks left by the drying liquid may be removed by breathing upon the mirror and rubbing with dry cotton. Do not allow the mirror to remain wet for any prolonged period of time.

GRAFLEX FOCUSING GROUND GLASS:

Do not remove the ground glass from the camera. Top surface of ground glass will require more cleaning then the first surface mirror. The underside of the ground glass can be cleaned by removing the lens and inserting through the opening a wadded, soft, lint-free cloth attached to a pencil or stick.

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TROUBLES AND REMEDIES — 4 x 5 R.B. SERIES D CAMERA — 29 November 1949

1. SHUTTER LOOP:
   Cause: Defective or worn escapement.
   Remedy: Fitting of new escapement necessary.

2. SHUTTER HANGS UP:
   Cause: Rough or burred escapement.
   Remedy: Buff and polish friction points of escapement, lubricate with grease graphite.

3. MIRROR FRAME LEVER WILL NOT TRIP SHUTTER:
   Cause: Weakened tension on mirror frame spring.
   Remedy: Increase tension on mirror frame spring.

4. LIGHT LEAKS AT REVOLVING BACK:
   Cause: Loosened ring screws.
   Remedy: Remove revolving back frame velvet and blocks. Tighten all screws. Fit new velvet and replace blocks previously removed.

5. EXCESS UP AND DOWN PLAY OF FOCUSING RACKS:
   Cause: Accidental damage, Normal wear.
   Remedy: Disassembly of camera front and adjust rack guides. Reassemble and test.

6. LOOSE FOCUSING RODS AND PINION:
   Cause: Loss of tension on focusing pinion.
   Remedy: Remove focusing pinion, disassemble, reform tension washer and reassemble focusing pinion.

7. OUT OF FOCUS PICTURES:
   Cause: Upper ground glass at top of camera out of register.
   Remedy: Place a focusing panel into position on the revolving back. Focus some object sharply on this panel and check the upper ground glass. Both images should be sharp. If the upper ground glass does not agree with the panel, raise or lower the upper ground glass until the image on this ground glass and panel agree.

8. SHUTTER MECHANISM SLUGGISH:
   Cause: Foreign matter in bearings.
   Remedy: Disassemble, clean, reassemble, and test shutter.

9. FILM HOLDER DOES NOT FIT TIGHTLY ON REVOLVING BACK.
   Cause: Screws in slide lock on revolving back loose.
   Remedy: Plug screw holes with mahogany or some other similar hard wood, and refit slide lock screws. Be sure to start holes first with awl to prevent the screws from splitting the wood.

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10. ROUGH OPERATING MIRROR RELEASE LEVER.
Cause: Lack of lubrication. Burrs on friction points.
Remedy: Remove mirror release lever, clean, polish friction points and lubricate with grease graphite.

11. SHUTTER CURTAIN REBOUNDS.
Cause: Incorrect setting of curtain.
Remedy: Remove shutter plate, reset curtain and check brake on escapement and reassemble.

12. FRONT BOX BROKEN UNDER BELLOWS.
Cause: Forcing lensboard into camera.
Remedy: Remove front box and bellows. Fit this metal plate over broken section to reinforce. Reassemble front box to camera.